

of the hypanthium, but elsewhere on the bud cone strongly ascending. As a rule the flower-buds never open.

BUREAU OF PLANT INDUSTRY, Washington, D. C.

EXPLANATION OF PLATE 111.

- Fig. a. *Oenothera Robinsonii*. Inflorescence of main stem.
 Fig. b. *Oenothera Robinsonii*. Inflorescence of side branch (cf. fig. c).
 Fig. c. *Oenothera venosa*. Inflorescence of side branch (cf. fig. b).
 Fig. d. *Oenothera cleistantha*. Inflorescence of main stem, in fruit.
 Fig. e. *Oenothera cleistantha*. Inflorescence of side branch, in flower.

THE NORTH AMERICAN REPRESENTATIVES OF DRYOPTERIS SPINULOSA, VAR. DILATATA.

M. L. FERNALD.

THE present writer, who has rarely intruded upon the preserves of the fern-specialists, ventures with some trepidation to discuss a plant which has already had more than its full share of attention. But, in an endeavor to settle as exactly as possible the identities of all the vascular plants known from Newfoundland, he has found himself constantly perplexed by the current treatments of the plant variously known in eastern America as *Dryopteris spinulosa* (Müll.) Kuntze, var. *dilatata* (Hoffm.) Underw. or *Aspidium spinulosum* (Müll.) Sw., var. *dilatatum* (Hoffm.) Hook. or *Dryopteris dilatata* (Hoffm.) Gray.

It has long been known that the common broad-fronded plant of the Hudsonian and Canadian areas of eastern America, which passes as *Dryopteris spinulosa*, var. *dilatata*, has the indusia quite glabrous, in this character exactly coinciding with the somewhat narrower-fronded *D. spinulosa* and diverging from var. *dilatata* of Europe in which the indusia, as regularly described by European authors, have the margins glandular-ciliate. In fact, in some American manuals *D. spinulosa* and its var. *dilatata* (or *D. dilatata*) are separated from var. *intermedia* (or *D. intermedia*) by their glabrous indusia, as opposed to the distinctly glandular indusia of the latter plant. In view of this departure from the European type it seems somewhat strange that American fern-students have clung so tenaciously to the name of the

European plant with glandular indusia and have so generally maintained it for the American plant with glabrous indusia. So fixed has been this tradition among American fern-students that, when the late B. D. Gilbert found an exceptional plant with glandular indusia, supposed by him to be an extreme of *D. dilatata*, he wrote:

“Babington, Sowerby, Smith, Moore, Hoffmann, Presl, DeCandolle, and most of the older botanists, regarded this [*D. dilatata*] as a distinct species. But all of them, whether they considered it a species or a variety, characterized it as having an ‘indusium fringed with stalked glands.’ American botanists, however, from an early period, made the point that the indusium was ‘smooth and naked,’ and this has been insisted upon as an indispensable requisite of the variety in this country. But is it so? If it has indusia with stalked glands in Europe, why may it not have them in this country also? It seems to me that the distinction is false, and cannot be regarded as imperative. The mere fact that much of the *dilatata* found here has a naked indusium does not preclude the possibility of a form that may agree with the English form.”¹ Gilbert then goes on to identify his unusual American plant with glandular indusia not as *D. dilatata* (true) but as *Lastraea dilatata*, var. *glandulosa* Moore or, as he renamed it, *Dryopteris spinulosa glandulosa*.

The writer is not at all confident that the American plant called by Gilbert *Dryopteris spinulosa glandulosa* and subsequently renamed by him *Nephrodium spinulosum fructuosum*² has much in common with the plant of Moore; but Gilbert’s argument, above quoted, does not change the fact that glandular indusia are practically unknown in the common plant of northeastern America now passing as *D. spinulosa*, var. *dilatata*. This is obvious not only from close study of the specimens, but from the writings of Gray, Eaton, Davenport, and a host of students of the present day; and in 1907 this common American plant was distinguished as *Aspidium spinulosum*, var. *dilatatum*, forma *anadenium* Robinson, RHODORA, ix. 84 (1907).

The chief object of the present note, however, is to call attention to a much more obvious character in which our plant departs very constantly from the European var. *dilatata*. In the common American plant the ovate or lanceolate scales of the stipe are very thin, translucent and soft in texture (like tissue paper), of a pale brown or slightly

¹ B. D. Gilbert, Fern Bull. viii. 10 (1900).

² Gilbert, List N. A. Pterid. 37 (1901).

rufescent color (essentially the cinnamon of Ridgway's Color Standards, but more dilute), sometimes a little deeper-colored near the center (about the warm sepia of Ridgway), and they rarely persist on the rhachis and very rarely on the rhachillas of the mature frond. In the European plant, on the other hand, the specimens fully agree with the European descriptions (too often drawn upon for American texts) in having the lance-attenuate scales very dark brown, usually blackish (closely matching in color the aniline black of Ridgway), and of comparatively firm texture, ordinarily quite like the dark basal scales of the stipe of *D. Goldiana*. These rather firm blackish scales usually persist to the summit of the mature stipe and (reduced in size) often extend well along the rhachis, and even along the rhachillas of the lower pinnae in some specimens. These characters, drawn from the European specimens in the Gray Herbarium and from an extensive suite of European material placed at the writer's disposal by Mr. Robert A. Ware, are, as said, in agreement with the European descriptions. For example, in his very detailed account of the plant in the British Isles, Moore said: "*Stipes* densely scaly; the scales spreading, most numerous at the base, but usually abundant throughout the whole length of the stipes, and in the normal plant lanceolate-attenuate, and dark-centered like those of the crown, frequently almost black. *Rachis* somewhat scaly, especially at the back, with small subulate more or less distinctly two colored scales."¹ Again, writing from the continental standpoint, Christ says: "Scales of the stipe smaller, black-brown, with paler margins."²

The glandular-ciliate margin of the indusium in the European plant is difficult to see except in perfect specimens; but the characteristic scales, not only in texture and color but in their comparative abundance, quickly separate the common European plant from the common plant so long mistaken for it in eastern America. In the Northwest, however, where so many identities with the European flora are known, the typical var. *dilatata* is found, much of the material from western Alaska, British Columbia and Washington and some from Oregon being quite inseparable, in the slender dark brown and rather persistent scales extending even along the middle pinnae, from the common European plant.

¹ Moore, Oct. Nat. Pr. Brit. Ferns, i. 226, 227 (1859).

² "Schuppen des Blattstiels schmaler, schwarzbraun mit blasserem Rande" — Christ, Farnkr. der Erde, 261 (1877).

That the common plant of eastern America has the scales paler-colored than in most European plants is not a new observation, though current descriptions and treatments of the plant might so indicate. The late D. C. Eaton explicitly said: "In European examples of [*Aspidium spinulosum*,] var. *dilatatum* the scales have a very conspicuous dark central spot or stripe. This is sometimes lacking in European specimens,¹ and generally so in North American. I notice a little of it in Oregon plants [typical var. *dilatatum* as above pointed out]."² Still earlier, the learned Gustav Kunze, recognizing in the common plant of our northern latitudes and mountains its true affinity, as a variety or species closely related to typical *D. spinulosa*, with its thin and pale quickly deciduous scales and glabrous indusia, rather than to true var. *dilatata*, published the following luminous note, which has received less attention than it deserves from students of American ferns:

"The identity of *A[spidium] spinulosum*, Sw., *A. dilatatum*, Sw., *A. dumetorum*, W., and *A. intermedium*, W., as different forms of one species, cannot be doubted any longer. A peculiar variety of *A. spinulosum* occurs in the northern latitudes and on the mountains of the Southern States, which must be studied more closely in its native localities, as it may prove to be a distinct species. I have specimens of this form from Newfoundland (La Pylaie), Greenland, and Labrador (Breutel and Kurr), New England mountains, sterile (Tuckerman), and from the highest tops of the Black Mountains, North Carolina (Rugel). Cultivated specimens have been communicated to me from the botanical garden of St. Petersburg, (Dr. Fischer as *A. spinulosum americanum*,) and from that of Berlin. The lowest pair of the mostly opposite pinnae is *ascending and curved upwards*, and has a *different direction from the other pinnae*. The pinnulae are more deeply pinnatifid, with more and sharper teeth than in the common form; *those of the lowest pinnae, especially near the base, are much elongated downwards*, by which these pinnae assume a very irregularly triangular shape. The sori are nearer the middle nerve. The stipe is thickly covered with brown or redish paleae. If this form

¹ Eaton here referred to extreme variations in Europe, such as *Lastrea dilatata*, var. *glandulosa* Moore, with "fronds densely covered with stalked glands beneath. . . . ; scales. . . . pale whole-coloured, or faintly two-coloured, broadly lanceolate-ovate" — See Moore, l. c. 226.

² Eaton, Ferns N. A. ii. 167 (1880).

should eventually prove to be a distinct species, the name of *A. campylopterum* would be appropriate.”¹

Here, apparently, is the first and only time (except that Kunze subsequently listed it without comment) that the common plant of the New England and Canadian uplands has been given the recognition it deserves. Except in stature, broader fronds and more elongate irregularly triangular lower pinnae, the plant is close to *Dryopteris spinulosa* and in our northern forests certainly grades into it. As a variety, however, it deserves recognition as

DRYOPTERIS SPINULOSA (Müll.) Kuntze, var. **americana** (Fischer), n. comb. *Aspidium spinulosum americanum* Fischer according to Kunze, Am. Journ. Sci. ser. 2, vi. 84 (1848), not *A. americanum* Davenp. Am. Nat. xii. 714 (1878). *A. campylopterum* Kunze, l. c. (1848). *A. spinulosum*, var. *dilatatum*, forma *anadenium* Robinson, RHODORA, ix. 84 (1907).—Greenland and Labrador to British Columbia, south to the uplands of New England, Pennsylvania, Michigan, Idaho and Oregon, and on the mountains to North Carolina and Tennessee. Also eastern Asia.

GRAY HERBARIUM.

¹ Kunze, Am. Journ. Sci. ser. 2, vi. 83, 84 (1848).

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